

Remarks

Claims 19-21 and 27 have been rejected under 35 U.S.C. §102(e) as being anticipated by Endoh (US 6,234,787). Claims 1-3 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Endoh in view of Ahmady (US 5,165,887) and Holmer (US 4,547,148). Claims 4-9 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Endoh in view of Lipp (US 4,857,075). Claims 10, 12 and 13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Endoh in view of Pritchard (US 5,462,429). Claim 22 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Endoh in view of Pillard (US 3,885,919).

It is noted that in the apparent rejection of claims 19-21 and 27 as being anticipated by Endoh, the body of the rejection refers to claims 4-9 and does not mention claims 19-21 and 27. Therefore, it is unclear as to specifically what claims this rejection concerns. As a result, clarification of this rejection is respectfully requested. For purposes of this response, it is assumed that the reference to claims 4-9 is incorrect and that the 102(e) rejection is of claims 19-21 and 27.

The above-mentioned rejections are respectfully traversed and submitted to be inapplicable to the claims for the following reasons.

Claim 1 is patentable over the combination of Endoh, Ahmady and Holmer, since claim 1 recites a waste gas treatment system having, in part, a combustion chamber having an inner wall made of a fiber-reinforced ceramic material comprising ceramic cloth coated with a binder-containing ceramic material. The combination of Endoh, Ahmady and Holmer fails to properly disclose a combustion chamber as recited in claim 1.

Endoh discloses a combustion apparatus for removing harmful substances. The apparatus includes a combustion chamber 1 that has a cylindrical outer barrel 11 and a cylindrical inner barrel 12 made of porous material arranged concentrically. (See column 3, lines 7-23 and Figures 1-4). However, as indicated in the rejection, Endoh fails to disclose or suggest that the cylindrical inner barrel 12 is made of a fiber-reinforced ceramic material comprising ceramic cloth coated with a binder-containing ceramic material. As a result, the rejection relies on Ahmady and Holmer as disclosing this feature.

Ahmady discloses a burner element made of a cloth of woven ceramic fiber supported by a metallic layer. In another embodiment, the woven ceramic fiber is formed into a self-supporting element. The woven ceramic fiber is disclosed as possibly being "Fiberfrax Woven Textile" brand by Carbonundum Corporation. (See column 3, line 52 - column 4, line 8 and column 7, lines 1-9).

While Ahmady does not disclose that "Fiberfrax" is a ceramic cloth coated with a binder-containing ceramic material, the rejection relies on Holmer as providing evidence that "Fiberfrax" is understood in the art as being a ceramic cloth coated with a binder-containing ceramic material. However, Holmer fails to provide this evidence. The section of Holmer relied upon in the rejection states that a pad 15 can be formed by joining pieces of a fiber material, such as "Fiberfrax," together with a suitable inorganic refractory binder. (See column 2, lines 25-33). Thus, it is apparent that Holmer discloses that an inorganic refractory binder can be used to join pieces of "Fiberfrax" together and does not disclose that "Fiberfrax" is a ceramic cloth coated with a binder-containing material as indicated in the rejection.

Further, it is noted that Ahmady discloses that the burner element possesses a predetermined gas permeability adequate to avoid any significant back-flash during the use of the burner. (See Abstract). This indication that the burner element is gas permeable precludes the possibility that the "Fiberfrax" ceramic cloth contains a binder material.

As a result, the combination of Endoh, Ahmady and Holmer fails to disclose or suggest the present invention as recited in claim 1.

In other rejections, (1) Lipp, (2) Pritchard and (3) Pillard are relied upon as disclosing (1) a cooling jacket, (2) a mechanical wiper, and (3) a waste gas treatment system where waste gas is fed into chambers that gradually increase, respectively. However, none of these references discloses or suggests a combustion chamber as recited in claim 1.

Claim 4 is patentable over the combination of Endoh and Lipp, since claim 4 recites a waste gas treatment system having, in part, an auxiliary burning gas nozzle in a side wall of a cylindrical member of a burner part in a vicinity of an opening in a bottom of the burner part, the auxiliary burning gas nozzle having an auxiliary burning gas introduced therein by the auxiliary burning gas inlet part. The combination of Endoh and Lipp fails to disclose or suggest an auxiliary burning gas nozzle as recited in claim 4.

Endoh discloses a burner 2 located in a top of a combustion chamber 1, and an igniting pilot burner 3 and a gas introducing nozzle 4 located opposite to each other on upper sides of the combustion chamber 1. The burner 2 includes a raw gas channel 2a, a lift gas channel 2b, a combustion gas channel 2c, and a secondary air channel 2d positioned concentrically around each other. Further, the combustion chamber 1 has an opening at a bottom thereof. (See column 3, line 1 - column 4, line 10 and Figures 1-4). However, it is apparent from the above disclosure that Endoh fails to disclose or suggest an auxiliary burning gas nozzle in a side wall of a cylindrical member of a burner part in a vicinity of an opening in a bottom of the burner part, since the only burning gas is supplied by the pilot burner 3 in an upper side portion of the combustion chamber 1 away from the opening in the combustion chamber 1.

Lipp discloses a water jacket 32 that is used to cool a tube 22 (See column 10, lines 3-17 and Figure 1). However, Lipp also fails to disclose or suggest an auxiliary burning gas nozzle as recited in claim 4.

As a result, the combination of Endoh and Lipp fails to disclose or suggest the present invention as recited in claim 4.

Further, (1) Ahmady and Holmer, (2) Pritchard, and (3) Pillard are relied upon as disclosing (1) "Fiberfrax" ceramic cloth, (2) a mechanical wiper, and (3) a waste gas treatment system where waste gas is fed into chambers that gradually increase, respectively. However, none of these references discloses or suggests an auxiliary burning gas nozzle as recited in claim 4.

Claim 10 is patentable over the combination of Endoh and Pritchard, since claim 10 recites a waste gas treatment system having, in part, a dust remover provided to remove dust from at least one of an inner wall of a burner part and an inner wall of a combustion chamber or to prevent adhesion of dust thereto, wherein the dust remover comprises a dust scraping plate secured to a distal end of a shaft adapted to move vertically in the at least one of the burner part and the combustion chamber. The combination of Endoh and Pritchard fails to disclose or suggest a dust remover as recited in claim 10.

As indicated in the rejection, Endoh fails to disclose or suggest a dust remover. As a result, Pritchard is relied on as disclosing this feature.

Pritchard discloses a combustion chamber 2 having a wiper rod 40 secured between two rods 36 and 38 to a rod 30 that passes through the center of the combustion chamber 2. When the rod 30 is rotated, the wiper rod 40 is also rotated and can remove combustion products from the inner wall of the combustion chamber 2. (See column 6, lines 23-67 and the Figure).

The rejection states that Pritchard discloses that the wiper rod 40 can be configured to move vertically. However, Pritchard does not disclose this. Instead, Pritchard discloses that although the combustion chamber 2 is shown being vertical, the combustion chamber 2 can be orientated in any position, including horizontal. (See column 6, lines 55-67). In all cases, the wiper rod 40 is only disclosed as being able to rotate and cannot move vertically as suggested in the rejection.

Further, in combining Pritchard with Endoh, the rejection indicates that it would have been obvious to one of ordinary skill in the art to combine the wiper rod 40 with the combustion apparatus of Endoh because the wiper rod 40 allows for the removal of combustion products built up on the inner wall of the combustion chamber 1 of Endoh. However, the Applicants respectfully disagree with this assertion.

As discussed above with respect to claim 1, Endoh discloses that the cylindrical inner barrel 12 is made of a porous material so that when pressure gas is introduced into the combustion chamber 1, the pressure gas can pass through the pores of the cylindrical barrel 12. By forming the cylindrical barrel 12 of the combustion chamber 1 using porous material and by introducing the pressure gas, the pressure gas bursts onto the inner surface of the cylindrical inner barrel 12 through the pores, so that solid oxides and other powders occurring during combustion treatment of a raw gas are prevented by the bursting power of the gas from depositing on the inner surface of the cylindrical inner barrel 12. (See column 3, line 49 - column 4, line 33). Since the combination of the pressure gas and the porous cylindrical barrel 12 prevent any solid oxides or other powders from forming on the cylindrical inner barrel 12, it would not be obvious to one of ordinary skill in the art to add the wiper rod 40 to the combustion apparatus of Endoh because the purpose of the wiper rod 40 is to address a problem (the buildup of solid on the inside of a combustion chamber) that does not occur with the combustion apparatus of Endoh. Therefore, this combination is not proper.

Therefore, the combination of Endoh and Pritchard fails to disclose or suggest the present invention as recited in claim 10.

Further, (1) Ahmady and Holmer, (2) Lipp and (3) Pillard are relied upon as disclosing (1) "Fiberfrax" ceramic cloth, (2) a water jacket, and (3) a waste gas treatment system where waste gas is fed into chambers that gradually increase, respectively. However, none of these references discloses or suggests a dust remover as recited in claim 10.

Claim 19 is patentable over Endoh, since claim 19 recites a waste gas treatment system including, in part, burner part having a cylindrical member having a side wall, being closed at a top thereof and having an opening at a bottom thereof, the cylindrical member also having a waste gas inlet in the top thereof and an air nozzle at a predetermined position on the side wall thereof, the cylindrical member further having an auxiliary burning gas nozzle in the side wall in a vicinity of the opening, the air nozzle being arranged to blow a swirling air flow downward against the combustion flames formed downward below the opening as a result of ignition of an auxiliary burning gas injected from the auxiliary burning gas nozzle. Endoh fails to disclose or suggest a burner part having an air nozzle arranged to blow a swirling air flow downward against combustion flames and an auxiliary burning gas nozzle as recited in claim 19.

As discussed above with regard to claim 4, Endoh discloses a burner 2 located in a top of a combustion chamber 1, and an igniting pilot burner 3 and a gas introducing nozzle 4 located opposite to each other on upper sides of the combustion chamber 1. The burner 2 includes a raw gas channel 2a, a lift gas channel 2b, a combustion air channel 2c, and a secondary air channel 2d positioned concentrically around each other. Further, the combustion chamber 1 has an opening at a bottom thereof. (See column 3, line 1 - column 4, line 10 and Figures 1-4). Therefore, it is apparent from the above disclosure that the location of the combustion air channel 2c is located in the top of the combustion chamber 1 such that the combustion air channel 2c is only capable of blowing air straight down into the combustion chamber 1 and is not arranged to blow a swirling air flow as is recited in claim 19.

Further, as discussed above with regard to claim 4, Endoh fails to disclose or suggest an auxiliary burning gas nozzle in a side wall of a cylindrical member of a burner part in a vicinity of an opening in a bottom of the burner part.

As a result, Endoh fails to disclose or suggest the present invention as recited in claim 19.

In addition, (1) Ahmady and Holmer, (2) Pritchard, (3) Pillard, and (4) Lipp are relied upon as disclosing (1) "Fiberfrax" ceramic cloth, (2) a mechanical wiper, (3) a waste gas treatment system where waste gas is fed into chambers that gradually increase, and (4) a water jacket, respectively. However, none of these references discloses or suggests the above-discussed features of claim 19.

Claim 22 is patentable over the combination of Endoh and Pillard, since claim 22 recites a waste gas treatment system having, in part, a burner part having a cylindrical member having a side wall, being closed at a top thereof and having an opening at a bottom thereof, the cylindrical member also having a waste gas inlet in the top thereof and an air nozzle at a predetermined position on the side wall thereof, the cylindrical member further having an auxiliary burning gas nozzle in the side wall in a vicinity of the opening, wherein at least one of an inner diameter of the waste gas inlet and an inner diameter of the cylindrical member gradually increases toward a combustion chamber. The combination of Endoh and Pillard fails to disclose or suggest a burner part having an air nozzle at a predetermined position on the side wall thereof or at least one of an inner diameter of a waste gas inlet and an inner diameter of a cylindrical member gradually increasing toward a combustion chamber and an auxiliary burning gas nozzle as recited in claim 22.

As discussed above with regard to claim 4, Endoh discloses a burner 2 located in a top of a combustion chamber 1, and an igniting pilot burner 3 and a gas introducing nozzle 4 located opposite to each other on upper sides of the combustion chamber 1. The burner 2 includes a raw gas channel 2a, a lift gas channel 2b, a combustion air channel 2c, and a secondary air channel 2d positioned concentrically around each other. Further, the combustion chamber 1 has an opening at a bottom thereof. (See column 3, line 1 - column 4, line 10 and Figures 1-4). Therefore, it is apparent that Endoh discloses that the combustion air channel 2c is located on the top of the combustion chamber 1 and does not disclose that the combustion air channel 2c is located on a sidewall of the combustion chamber 1. Pillard also fails to disclose an air nozzle as recited in claim 22.

In addition, the rejection of claim 22 indicates that Endoh fails to disclose or suggest at least one of an inner diameter of a waste gas inlet and an inner diameter of a cylindrical member gradually increasing toward a combustion chamber. As a result, the rejection relies on Pillard as disclosing this feature.

Pillard discloses flare or chimney stacks including a plurality of combustion chambers 4 each having a perforated ring 6 (gas burner) and a space 5 (air inlet). A waste gas to be treated is supplied to the plurality of burners 6, the number of which is selected based on the volume of gas to be treated and from the bottom burner towards the top burner. The diameters of each of the combustion chambers gradually increase the higher in the stack the combustion chamber is located because the highest combustion chamber receives the burnt gas from all of the lower combustion chambers and between each adjacent pair of combustion chambers one of the spaces 5 is provided to introduce air. (See column 3, lines 45-68 and Figure 1).

However, it is apparent that the combination of the cylinders 4 of Pillard with the combustion apparatus of Endoh still fails to disclose or suggest at least one of an inner diameter of a waste gas inlet and an inner diameter of a cylindrical member gradually increasing toward a combustion chamber. While Pillard discloses a number of combustion chambers 4 that have increasing diameters, within each of the combustion chambers 4, the respective perforated ring 6 in which residual gases arrive and the respective inlet for combustion-supporting air have a constant diameter. Therefore, Pillard also fails to disclose or suggest this limitation of claim 22.

Further, as discussed above with regard to claim 4, Endoh fails to disclose or suggest an auxiliary burning gas nozzle in a side wall of a cylindrical member of a burner part in a vicinity of an opening in a bottom of the burner part. Pillard also fails to disclose or suggest this feature.

Therefore, the combination of Endoh and Pillard fails to disclose or suggest the present invention as recited in claim 22.

In addition, (1) Ahmady and Holmer, (2) Pritchard, and (3) Lipp are relied upon as disclosing (1) "Fiberfrax" ceramic cloth, (2) a mechanical wiper, and (3) a water jacket, respectively. However, none of these references discloses or suggests the above-discussed features of claim 22.

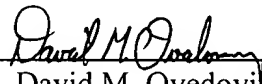
Because of the above mentioned distinctions, it is believed clear that claims 1-10, 12, 13, 19-23 and 27 are patentable over the references relied upon in the rejections. Furthermore, it is submitted that the distinctions are such that a person having ordinary skill in the art at the time of invention would not have been motivated to make any combination of the references of record in such a manner as to result in, or otherwise render obvious, the present invention as recited in claims 1-10,

12, 13, 19-23 and 27. Therefore, it is submitted that claims 1-10, 12, 13, 19-23 and 27 are clearly allowable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. The Examiner is invited to contact the undersigned by telephone if it is felt that there are issues remaining which must be resolved before allowance of the application.

Respectfully submitted,

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